

What is claimed is:

1. A rewritable multi-layer optical recording medium having a plurality of recording layers, wherein data recording
5 areas are divided by preformatted areas in a tracing direction in each of the plurality of recording layers,

wherein the preformatted areas in at least a most distal recording layer among the plurality of recording layers from an object lens adapted to collect a radiated light beam include
10 guard areas located at both ends of the respective preformatted areas in the tracing direction and having no data recorded thereon, and wherein the length of the guard area GL satisfies;

$$GL \geq YL + T \times (NA/n)/[1 - (NA/n)^2]^{1/2}$$

where,

15 YL: a maximum allowable value of position deviation between the preformatted areas in the most distal recording layer and in another recording layer in the tracing direction

NA: the numerical aperture of the object lens

20 T: a distance between the most distal recording layer and the another recording layer

n: an refraction index of a medium between the most distal recording layer and the another recording layer.

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2. A rewritable multi-layer optical recording medium according to claim 1, wherein each of the plurality of recording

layers includes a phase change medium for data signal recording, and the length of the guard area GL satisfies the following formulas:

$$GL \geq YL + R \times [1 - 2 \times VP \times (TA + TC) / |TA - TC|]$$

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$$R = T \times (NA/n) / [1 - (NA/n)^2]^{1/2}$$

Where,

TC: transmittance of a crystal portion of the
phase change medium

TA: transmittance of an amorphous portion of the
10 phase change medium

VP: a maximum allowable variation rate of intensity of
the light beam.

3. A method of manufacturing a rewritable and rotatable
15 multi-layer optical recording medium having a plurality of
recording layers, wherein data recording areas are divided by
preformatted areas in each of the plurality of recording layers
in a tracing direction, comprising the steps of:

A) forming a projection of a circular shape on a first
20 substrate such that the projection is substantially coaxial to
a rotation center of the first substrate, said first substrate
having at least one recording layer;

B) forming a recess in a second substrate such that said
recess is substantially coaxial to a rotation center of said
25 second substrate and adapted to engage with said projection,
said second substrate having at least one recording layer; and

C) engaging said projection and said recess with each

other to attach said first and second substrates to each other.

4. A method of manufacturing a rewritable and rotatable multi-layer optical recording medium according to claim 3
5 further comprising the steps of:

D) forming a second projection on said first substrate in one of a center portion and a peripheral portion of said first substrate; and

E) forming a second recess in said second substrate such
10 that said second projection engages with said second recess,
wherein said second projection and said second recess are located at positions that substantially align the preformatted areas of said first substrate with the preformatted areas of said second substrate upon attaching said first and second
15 substrates to each other.

5. A method of manufacturing a rewritable and rotatable multi-layer optical recording medium according to claim 3 further comprising the steps of:

20 D) forming a second recess in said first substrate in one of a center portion and a peripheral portion of said first substrate; and

E) forming a second projection on said second substrate such that said second projection engages with said second
25 recess,

wherein said second projection and said second recess are located at positions that substantially align the preformatted

areas of said first substrate with the preformatted areas of said second substrate upon attaching said first and second substrates to each other.

5 6. A method of manufacturing a rewritable and rotatable multi-layer optical recording medium according to claim 3 further comprising the steps of:

 D) forming a first mark, which indicates a position of a preformatted area in said first substrate, on any one of a
10 center portion, a peripheral portion and a peripheral side portion of said first substrate; and

 E) forming a second mark, which indicates a position of a preformatted area in said second substrate, on any one of a center portion, a peripheral portion and a peripheral side
15 portion of said second substrate,

 wherein the step of engaging said projection and said recess with each other includes a step of matching the first mark of said first substrate to the second mark of said second substrate.

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 7. A multi-layer, rotation-type optical recording medium fabricated by the method according to claim 3.